REJ10J1320-0100

Everywhere you imagine.

H8/36109 Group Expansion I/O Board

HS36109EIO61H User's Manual

Renesas Microcomputer Development Environment System

H8 Family / H8/300H Tiny Series

HS36109EIO61HE

User's Manual

Rev.1.00
Revision Date: Apr. 06, 2006

Renesas Technology
www.renesas.com

Keep safety first in your circuit designs!

1. Renesas Technology Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corp. product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corp. or a third party.
2. Renesas Technology Corp. assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corp. without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor for the latest product information before purchasing a product listed herein.
   The information described here may contain technical inaccuracies or typographical errors.
   Renesas Technology Corp. assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.
   Please also pay attention to information published by Renesas Technology Corp. by various means, including the Renesas Technology Corp. Semiconductor home page (http://www.renesas.com).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corp. assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corp. semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corp. is necessary to reprint or reproduce in whole or in part these materials.
7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
   Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
8. Please contact Renesas Technology Corp. for further details on these materials or the products contained therein.

IMPORTANT INFORMATION

READ FIRST

• READ this user's manual before using this emulator product.

• KEEP the user's manual handy for future reference.

Do not attempt to use the emulator product until you fully understand its mechanism.

Emulator Product:

Throughout this document, the term "emulator product" shall be defined as the following products produced only by Renesas Technology Corp. excluding all subsidiary products.

- E6000 emulator station
- Expansion I/O board
- User system interface cables
- PC interface board

The user system or a host computer is not included in this definition.

Purpose of the Expansion I/O Board:

This expansion I/O board is installed in the E6000 emulator, and enables the emulator station to be connected to the user system interface cable. This expansion I/O board must only be used for the above purpose.

Improvement Policy:

Renesas Technology Corp. (including its subsidiaries, hereafter collectively referred to as Renesas) pursues a policy of continuing improvement in design, functions, performance, and safety of the emulator product. Renesas reserves the right to change, wholly or partially, the specifications, design, user's manual, and other documentation at any time without notice.

Target User of the Emulator Product:

This emulator product should only be used by those who have carefully read and thoroughly understood the information and restrictions contained in the user's manual. Do not attempt to use the emulator product until you fully understand its mechanism.

It is highly recommended that first-time users be instructed by users that are well versed in the operation of the emulator product.

LIMITED WARRANTY

Renesas warrants its emulator products to be manufactured in accordance with published specifications and free from defects in material and/or workmanship. Renesas, at its option, will repair or replace any emulator products returned intact to the factory, transportation charges prepaid, which Renesas, upon inspection, determine to be defective in material and/or workmanship. The foregoing shall constitute the sole remedy for any breach of Renesas' warranty. See the Renesas warranty booklet for details on the warranty period. This warranty extends only to you, the original Purchaser. It is not transferable to anyone who subsequently purchases the emulator product from you. Renesas is not liable for any claim made by a third party or made by you for a third party.

DISCLAIMER

RENESAS MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, ORAL OR WRITTEN, EXCEPT AS PROVIDED HEREIN, INCLUDING WITHOUT LIMITATION THEREOF, WARRANTIES AS TO MARKETABILITY, MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR USE, OR AGAINST INFRINGEMENT OF ANY PATENT. IN NO EVENT SHALL RENESAS BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE, OR LOSSES OR EXPENSES RESULTING FROM ANY DEFECTIVE EMULATOR PRODUCT, THE USE OF ANY EMULATOR PRODUCT, OR ITS DOCUMENTATION, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCEPT AS EXPRESSLY STATED OTHERWISE IN THIS WARRANTY, THIS EMULATOR PRODUCT IS SOLD "AS IS ", AND YOU MUST ASSUME ALL RISK FOR THE USE AND RESULTS OBTAINED FROM THE EMULATOR PRODUCT.

State Law:

Some states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which may vary from state to state.

The Warranty is Void in the Following Cases:

Renesas shall have no liability or legal responsibility for any problems caused by misuse, abuse, misapplication, neglect, improper handling, installation, repair or modifications of the emulator product without Renesas' prior written consent or any problems caused by the user system.

All Rights Reserved:

This user's manual and emulator product are copyrighted and all rights are reserved by Renesas. No part of this user's manual, all or part, may be reproduced or duplicated in any form, in hard-copy or machine-readable form, by any means available without Renesas' prior written consent.

Other Important Things to Keep in Mind:

1. Circuitry and other examples described herein are meant merely to indicate the characteristics and performance of Renesas' semiconductor products. Renesas assumes no responsibility for any intellectual property claims or other problems that may result from applications based on the examples described herein.

2. No license is granted by implication or otherwise under any patents or other rights of any third party or Renesas.

Figures:

Some figures in this user's manual may show items different from your actual system.

Limited Anticipation of Danger:

Renesas cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this user's manual and on the emulator product are therefore not all inclusive. Therefore, you must use the emulator product safely at your own risk.

SAFETY PAGE

READ FIRST

• READ this user's manual before using this emulator product.

• KEEP the user's manual handy for future reference.

Do not attempt to use the emulator product until you fully understand its mechanism.

DEFINITION OF SIGNAL WORDS

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION **CAUTION** used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE emphasizes essential information.

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Do not repair or remodel the emulator product by yourself for electric shock prevention and quality assurance.**
2. **Always switch OFF the E6000 emulator and user system before connecting or disconnecting any CABLES or PARTS.**
3. **Always before connecting any CABLES, make sure that pin 1 on both sides are correctly aligned.**
4. **Supply power according to the power specifications and do not apply an incorrect power voltage. Use only the provided power cable.**

Preface

Thank you for purchasing this H8/36109 group expansion I/O board (HS36109EIO61H; hereinafter referred to as the expansion I/O board) for the E6000 emulator.

The expansion I/O board enables user systems for Renesas' original microcomputer H8/36109 group to be developed using an H8/36109 group E6000 emulator (HS3664EPI61H or HS3664EPI62H; hereinafter referred to as the emulator).

Contents

Section 1 Overview 1
1.1 Environment Conditions 1
1.2 Supported MCUs and User System Interface Cable 1
1.3 Operating Voltage and Frequency Specifications 2
1.4 Components 3

Section 2 Connection Procedures 5
2.1 Using Emulator without Connecting User System 5
2.2 Using Emulator with Connecting User System through User System Interface Cable 6

Section 3 User System Interface Circuit 9

Section 4 Notice 11
4.1 Notes on Accessing Registers 11
4.2 Power-on Reset and Low-voltage Detection Circuits 13
4.3 On-chip Oscillator 13

Section 1 Overview

The H8/36109 group E6000 expansion I/O board (hereinafter referred to as the expansion I/O board) is an efficient software and hardware development support tool for application systems using timer RC, timer RD, SCI3, and AD converter (ports D to H are shared), which are dedicated additional functions of the Renesas' original microcomputer H8/36109 group.

The expansion I/O board should be used with H8/3664 series E6000 emulator station (HS3664EPI61H or HS3664EPI62H; hereinafter referred to as the emulator).

1.1 Environment Conditions

Table 1 Environment Conditions

Item	Specification
Temperature	Operating: +10 to +35°C
	Storage: –10 to +50°C
Humidity	Operating: 35 to 80% RH; no condensation
	Storage: 35 to 80% RH; no condensation
Ambient gases	No corrosive gases
Power supply	Power supply from E6000 emulator station
User system voltage (UVcc)	Depends on the MCU within the range 3.0 V to 5.5 V

1.2 Supported MCUs and User System Interface Cable

Table 2 shows the correspondence between the MCUs and the user system interface cable supported by the emulator.

Table 2 H8/36109 Group MCUs and User System Interface Cable

MCU Type Number	Package	E6000 User System Interface Cable
HD64F36109 HD64336109 HD64336108 HD64336107	100-pin QFP (FP-100A)	HS36109ECF61H
	100-pin QFP (FP-100U)	HS36109ECH61H

1.3 Operating Voltage and Frequency Specifications

Table 3 shows the MCU operating voltage and frequency specifications supported by the emulator. If the emulator is used in an environment that exceeds the operating voltage range and operating frequency range guaranteed for the MCU operation, normal emulator operation is not guaranteed.

Table 3 Operating Voltage and Frequency Specifications

MCU Type	Operating Voltage (V)	Operating Frequency Range (ϕ) (MHz)
H8/36109 group	3.0 to 5.5	4 to 10
	4.0 to 5.5	4 to 20

NOTE

For details on the operating voltage and frequency specifications, refer to the MCU hardware manual.

1.4 Components

Figure 1.1 shows the HS36109EIO61H expansion I/O board appearance, and table 4 lists the components of the expansion I/O board. Please make sure you have all of these components when unpacking.

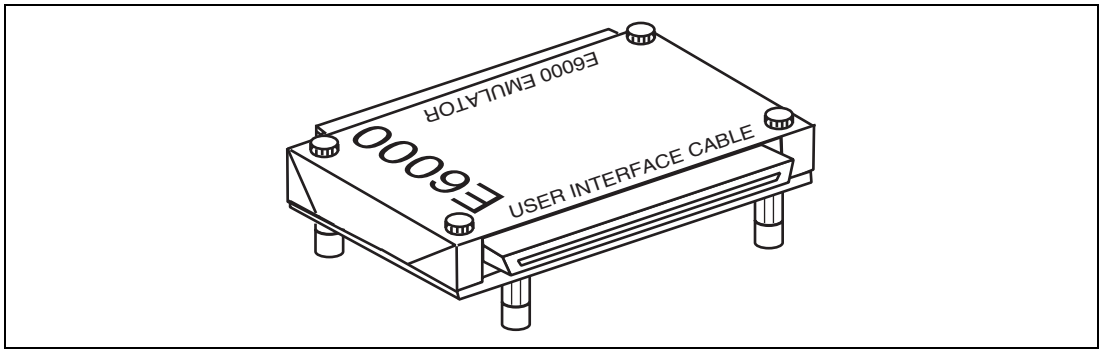

Figure 1.1 HS36109EIO61H Expansion I/O Board

Table 4 HS36109EIO61H Components

No.	Component	Quantity	Remarks
1	HS36109EIO61H	1	Expansion I/O board
2	Documentation	1	User's manual for HS36109EIO61H (this manual)

Section 2 Connection Procedures

⚠ WARNING

Always switch OFF the user system and the emulator product before the EXPANSION I/O BOARD or USER SYSTEM INTERFACE CABLE is connected to or removed from any part.

Before connecting, make sure that pin 1 on each side is correctly aligned. Failure to do so will result in a FIRE HAZARD and will damage the user system, the emulator product, the user system interface cable, and the expansion I/O board, or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

2.1 Using Emulator without Connecting User System

1. Make sure the emulator is turned off.
2. After making sure the direction of the expansion I/O board connector (labeled E6000 EMULATOR) is correct, firmly insert the expansion I/O board connector into the emulator station connector (labeled USER INTERFACE). It is possible to use the expansion I/O board connecting only to the emulator.

2.2 Using Emulator with Connecting User System through User System Interface Cable

CAUTION

When connecting or removing the user system interface cable, apply force only in the direction suitable for connection or removal, while making sure not to bend or twist the cable or connectors.
Otherwise, the cables or connectors will be damaged.

1. Make sure that the emulator and the user system are turned off.
2. [1] After making sure the direction of the expansion I/O board connector (labeled E6000 EMULATOR) is correct, firmly insert the expansion I/O board connector into the emulator station connector (labeled USER INTERFACE; [1] in figure 2.1).
   [2] Connect the expansion I/O board (labeled USER INTERFACE CABLE) and the user system interface cable body.

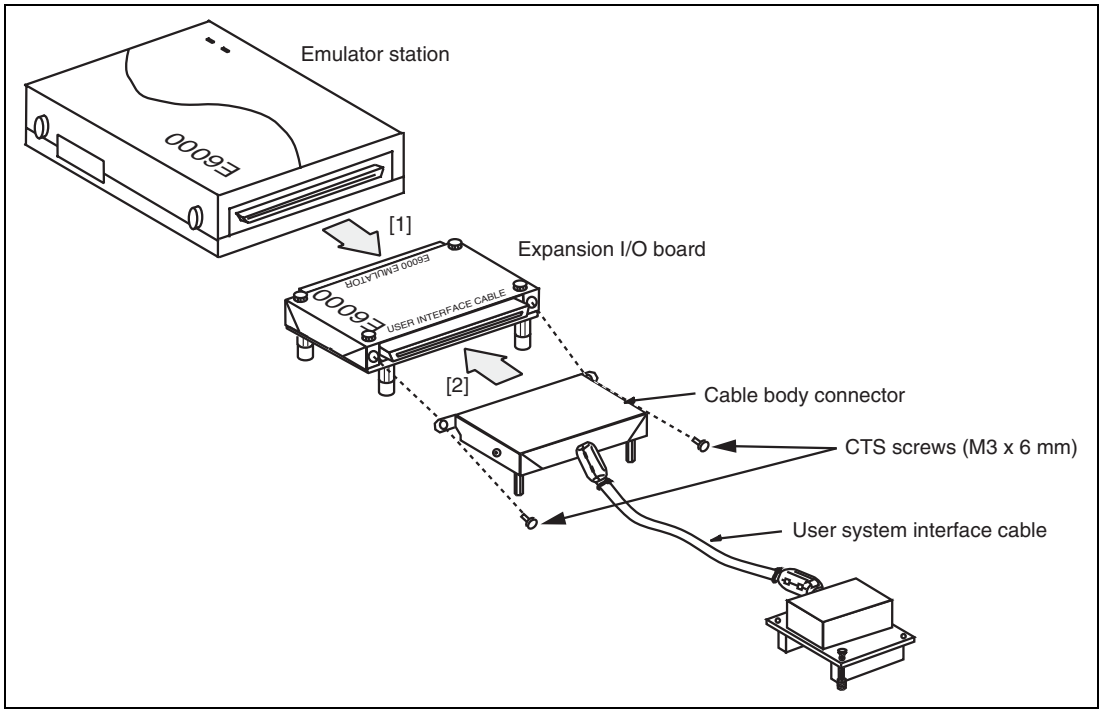

Figure 2.1 Connecting Expansion I/O Board to Emulator Station and User System Interface Cable

Section 3 User System Interface Circuit

Switches, protection circuits, and termination circuits are provided for this expansion I/O board and used to connect signals to the user system interface cable. Figure 3.1 shows the user system interface signal circuit.

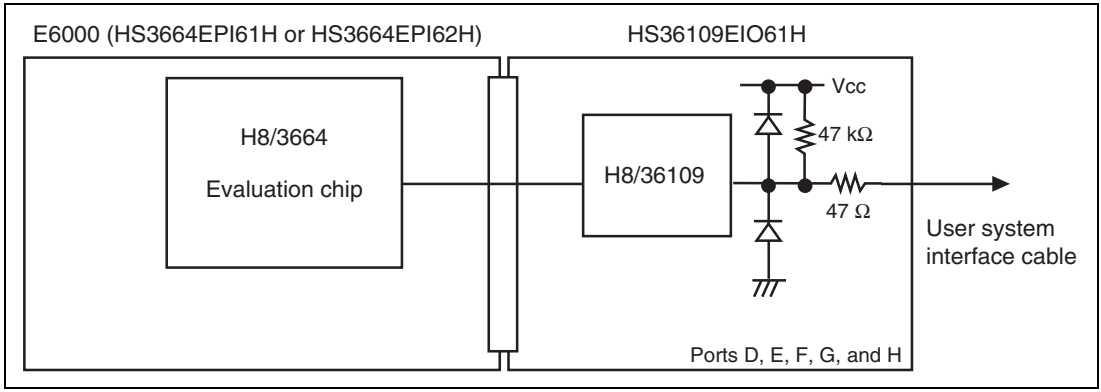

Figure 3.1 User System Interface Signal Circuit (Ports D, E, F, G, and H)

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **This expansion I/O board is specifically designed for the H8/36109 group using the H8/3664 series E6000 emulator (HS3664EPI61H or HS3664EPI62H). Do not use this expansion I/O board with any other emulator station.**
2. **Use the H8/36109 group user system interface cable (HS36109ECF61H for FP-100A or HS3109ECH61H for FP-100U).**
   Do not use any other series of user system interface cable.

1. Do not place heavy objects on the expansion I/O board.
2. Power is supplied from the emulator station to the expansion I/O board.

4.1 Notes on Accessing Registers

There are the following notes on accessing registers due to the differences between the product chip and the evaluation chip.

1. For bits 7 and 6 of H'FFF5 (interrupt enable register 2), bits 7, 4, and 2 of H'FFF9 (module standby control register 1), and bits 6, 5, 3, and 1 of H'FFFA (module standby control register 2), the hardware manual describes that 'The initial value is 0. Reserved. This bit is always read as 0.' In the emulator, replace the description as 'Set the bit to 0. This bit is read as the set value.'
2. For bit 0 of H'FFFB, the hardware manual describes that 'Reserved.' In the emulator, replace the description as 'Set the bit to 0. This bit is read as the set value.'
3. In the hardware manual, there are registers in addresses H'F730 to H'F731, H'F734, H'F738 to H'F73A, H'F73C to H'F73F, H'FF90 to H'FF93, H'FF9B, and H'FFEF. In the emulator, since there are no registers in those addresses, the description will be 'This bit cannot be modified and the read value is undefined.'

Table 5 Differences between the Evaluation Chip and Product Chip Registers

	Address	Register	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
H8/3660 (Evaluation chip)	H'F730	-	-	-	-	-	-	-	-	-
	H'F731	-	-	-	-	-	-	-	-	-
	H'F734	-	-	-	-	-	-	-	-	-
	H'F738	-	-	-	-	-	-	-	-	-
	H'F739	-	-	-	-	-	-	-	-	-
	H'F73A	-	-	-	-	-	-	-	-	-
	H'F73C	-	-	-	-	-	-	-	-	-
	H'F73D	-	-	-	-	-	-	-	-	-
	H'F73E	-	-	-	-	-	-	-	-	-
	H'F73F	-	-	-	-	-	-	-	-	-
	H'FFEE	PCRC	-	-	-	-	-	-	-	-
	H'FFEF	-	-	-	-	-	-	-	-	-
	H'FFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF7	IRR2	IRRTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	-	MSTTZ0	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	-
	H'FFFC	TSCR	-	-	-	-	-	-	-	-

Table 5 Differences between the Evaluation Chip and Product Chip Registers (cont)

	Address	Register	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	H'F730	LVDCR	LVDE	BGRE	-	-	LVDSEL	LVDRE	LVDDE	LVDUE
	H'F731	LVDSR	-	-	-	-	-	-	LVDDF	LVDUF
	H'F734	CKCSR	PMRJ1	PMRJ0	-	OSCSEL	CKSWIE	CKSWIF	-	CKCSTA
	H'F738	RCCR	RCSTP	FSEL	VCLSEL	-	-	-	RCPSC1	RCPSC0
	H'F739	RCTRMDPR	WRI	PRWE	LOCKDW	TRMDRWE	-	-	-	-
	H'F73A	RCTRMDR	TRMD7	TRMD6	TRMD5	TRMD4	TRMD3	TRMD2	TRMD1	TRMD0
	H'F73C	ICRA	ICRA7	ICRA6	ICRA5	ICRA4	ICRA3	ICRA2	ICRA1	ICRA0
H8/36109	H'F73D	ICRB	-	ICRB6	ICRB5	ICRB4	-	-	-	-
	H'F73E	ICRC	ICRC7	-	-	ICRC4	-	ICRC2	ICRC1	ICRC0
	H'F73F	ICRD	ICRD7	ICRD6	ICRD5	ICRD4	ICRD3	-	-	-
	H'FFEE	PCRC	-	-	-	-	PCRC3	PCRC2	PCRC1	PCRC0
	H'FFEF	SYSCR3	STS3	-	-	-	-	-	-	-
	H'FFF5	IENR2	-	-	IENTB1	-	-	-	-	-
	H'FFF7	IRR2	-	-	IRRTB1	-	-	-	-	-
	H'FFF9	MSTCR1	-	MSTIIC	MSTS3	-	MSTWD	-	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	-	-	MSTTB1	-	-	-	MSTPWM
	H'FFFB	-	-	-	-	-	-	-	-	-
	H'FFFC	-	-	-	-	-	-	-	-	-

4.2 Power-on Reset and Low-voltage Detection Circuits

For the product chip, power-on reset and low-voltage detection circuits can be selected as the optional functions. However, since the evaluation chip does not incorporate these functions, software debugging cannot be performed in the emulator.

4.3 On-chip Oscillator

The product chip incorporates an on-chip oscillator. However, since the evaluation chip does not incorporate this function, software debugging on the on-chip oscillator and the general input/output function of port J cannot be performed in the emulator.

H8/36109 Group Expansion I/O Board
HS36109EIO61H User's Manual

Publication Date: Rev.1.00, April 6, 2006
Published by: Sales Strategic Planning Div.
Renesas Technology Corp.
Edited by: Customer Support Department
Global Strategic Communication Div.
Renesas Solutions Corp.

© 2006. Renesas Technology Corp. All rights reserved. Printed in Japan.

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

RENESAS SALES OFFICES

http://www.renesas.com

Refer to "**http://www.renesas.com/en/network**" for the latest and detailed information.

Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology (Shanghai) Co., Ltd.
Unit 204, 205, AZIACenter, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7898

Renesas Technology Hong Kong Ltd.
7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.
10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology Singapore Pte. Ltd.
1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.
Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

Renesas Technology Malaysia Sdn. Bhd
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510

H8/36109 Group
Expansion I/O Board
HS36109EIO61H
User's Manual

Renesas Technology Corp.
2-6-2, Ote-machi, Chiyoda-ku, Tokyo, 100-0004, Japan